

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 18-26, 29-31, 34, 37 and 38 are presented for consideration. Claims 18, 26, 29-31 and 34 are independent. Claims 27, 28, 32, 33, 35 and 36 have been canceled without prejudice or disclaimer. Claims 26, 31 and 34 have been amended to clarify features of the subject invention, while claims 37 and 38 have been added to recite additional features of the subject invention. Support for these changes and claims can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant requests favorable reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Claims 32, 33, 35 and 36 were objected to on formal grounds. To expedite prosecution, these claims have been canceled without prejudice or disclaimer. Accordingly, this rejection has become moot and should be withdrawn.

Turning now to the art rejections, claims 18-22, 24, 25, 29 and 30 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,211,544 to Shiraishi. Claims 26, 27, 31, 32 and 35 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,285,443 to Wangler et al. Claim 23 was rejected under 35 U.S.C. § 103 as being unpatentable over the Shiraishi patent in view of U.S. Patent No. 4,918,583 to Kudo et al. Claims 28, 33, 34 and 36 were rejected under 35 U.S.C. § 103 as being unpatentable over the Shiraishi patent and further in view of U.S. Patent No. 5,659,429 to Kudo. Applicant submits that the cited art, whether

taken individually or in combination, does not teach many features of the present invention as previously recited in these claims. Therefore, these rejections are respectfully traversed.

In one aspect of the invention, independent claim 18 recites an illumination optical system for illuminating a surface, to be illuminated, with use of light from a light source. The illumination optical system includes a diffractive optical element for forming a desired light intensity distribution upon a predetermined plane, an angular distribution transforming unit for transforming an angular distribution of light incident or to be incident on the diffractive optical element into a desired distribution, the angular distribution transforming unit also being operable to change the desired distribution, a multiple producing unit, wherein the predetermined plane is a light entrance surface of the multiple beam producing unit, and a light projecting element for superposing light rays from the multiple beam producing unit one upon another on the surface to be illuminated.

In another aspect of the invention, independent claim 26 recites an illumination optical system for illuminating a surface, to be illuminated, with use of light from a light source. In yet another aspect of the invention, independent claim 29 recites an exposure apparatus. In still another aspect of the invention, independent claim 30 recites a device manufacturing method. These claims likewise recite features along the lines discussed above with respect to independent claim 18 regarding an angular distribution unit for transforming an angular distribution of light incident or to be incident on a diffractive optical element into a desired distribution, the angular distribution transforming unit also being operable to change the desired distribution.

In yet other aspects of the invention, independent claim 31 recites a projection exposure apparatus that includes, among other features, an angular distribution transforming unit along the lines discussed above with respect to independent claims 18, 26, 29 and 30, and further recites an internal reflection member effective to make uniform the light intensity distribution of the light incident on the light entrance surface thereof, wherein the light entrance surface of the internal reflection member and the diffractive optical member are optically conjugate with each other.

In still another aspect of the invention, independent claim 34 recites a device manufacturing method that includes features along the lines discussed above with respect to independent claim 31.

Applicant submits that the cited art does not teach or suggest such features of the present invention, as recited in the independent claims.

The Examiner relies on the Shiraishi patent for showing an illumination optical system that includes a diffractive optical element, an angular distribution transforming unit, a multiple beam producing unit, a light projecting element and a blocking member. The Examiner specifically refers to Figure 20 in that patent. Applicant submits, however, that the lens system 71 shown in that figure is in fact an optical element that merely serves to collect divergent light from a second focal point of the elliptical mirror. This is discussed at column 28, lines 40-44 of the Shiraishi patent. Applicant submits, therefore, that this patent does not teach or suggest an optical element being operable to change a desired distribution in the manner of the present invention as recited in, for example, independent claims 18, 26, 29 and 30. Likewise, that patent does not teach or suggest anything regarding a light entrance surface of an internal reflection

member and a diffractive optical element being optically conjugate with each other as in the present invention recited in independent claims 31 and 34.

The Examiner relies on the Wangler et al. patent for showing an illumination optical system including a diffractive optical element and an angular distribution transforming unit. Applicant submits, however, that the diffractive optical element 8 in the Wangler et al. patent is not conjugate with the entrance surface 5e of the glass rod 5. Rather, to the contrary, that element is placed to satisfy the Fourier transform relation. Accordingly, Applicant submits that the Wangler et al. patent neither teaches nor suggests at least the feature of the present invention that the light entrance surface of the internal reflection member and the diffractive optical element are optically conjugate with each other, as in the present invention recited in independent claim 26, for example.

The Examiner relies on the Kudo '583 patent for showing the use of an internal reflection member (that is, an internal reflection type integrator 10) in an illumination optical system, and the Kudo '429 for showing, in Figure 10A, an illumination optical system including a plurality of optical elements (lenses 3a and 3b) that are placed in an optical path. Applicant submits, however, that these patents, as with the remaining art, do not teach or suggest the salient features of Applicant's present invention, as recited in the independent claims, which have been discussed above. Notably, those patents do not teach or suggest anything regarding an angular distribution transforming unit also being operable to change a desired distribution or a light entrance surface of an internal reflection member and a diffractive optical element being optically conjugate with each other. Accordingly, those patents add nothing to the teachings of the Shiraishi or Wangler

et al. patents that would render obvious Applicant's present invention recited in the independent claims.


For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 18, 26, 29-31 and 34, is patentably defined over the cited art.

Dependent claims 19-25, 37 and 38 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



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